PCT/US99/04904

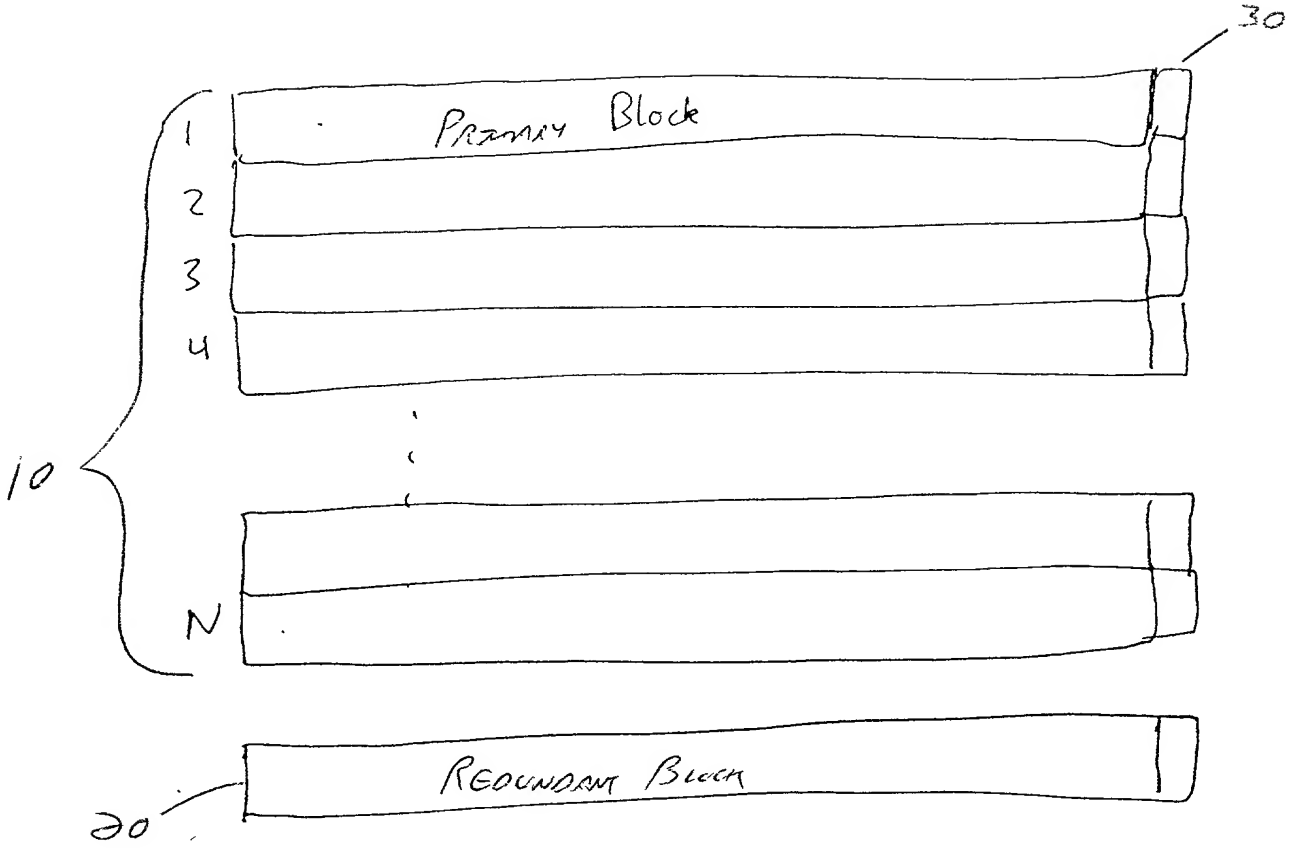

FIGURE 1

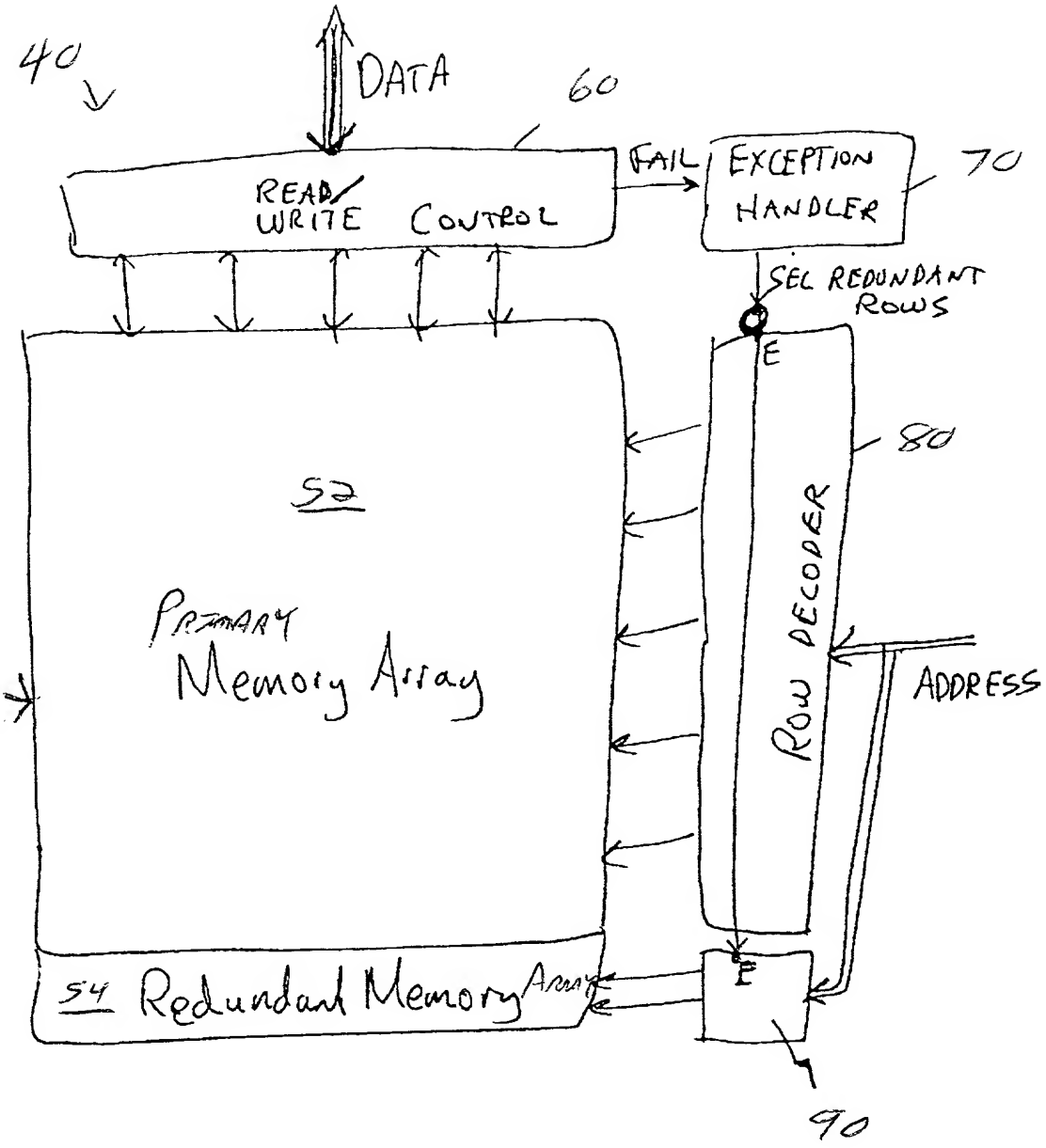
40
DATA
60
READ/
WRITE CONTROL
FAIL
EXCEPTION
HANDLER
70
SEL REDUNDANT
ROWS
E
80
52
PRIMARY
Memory Array
50
ROW DECODER
ADDRESS
54 Redundant Memory Array
E
90

FIGURE 2

10024645 - 122403

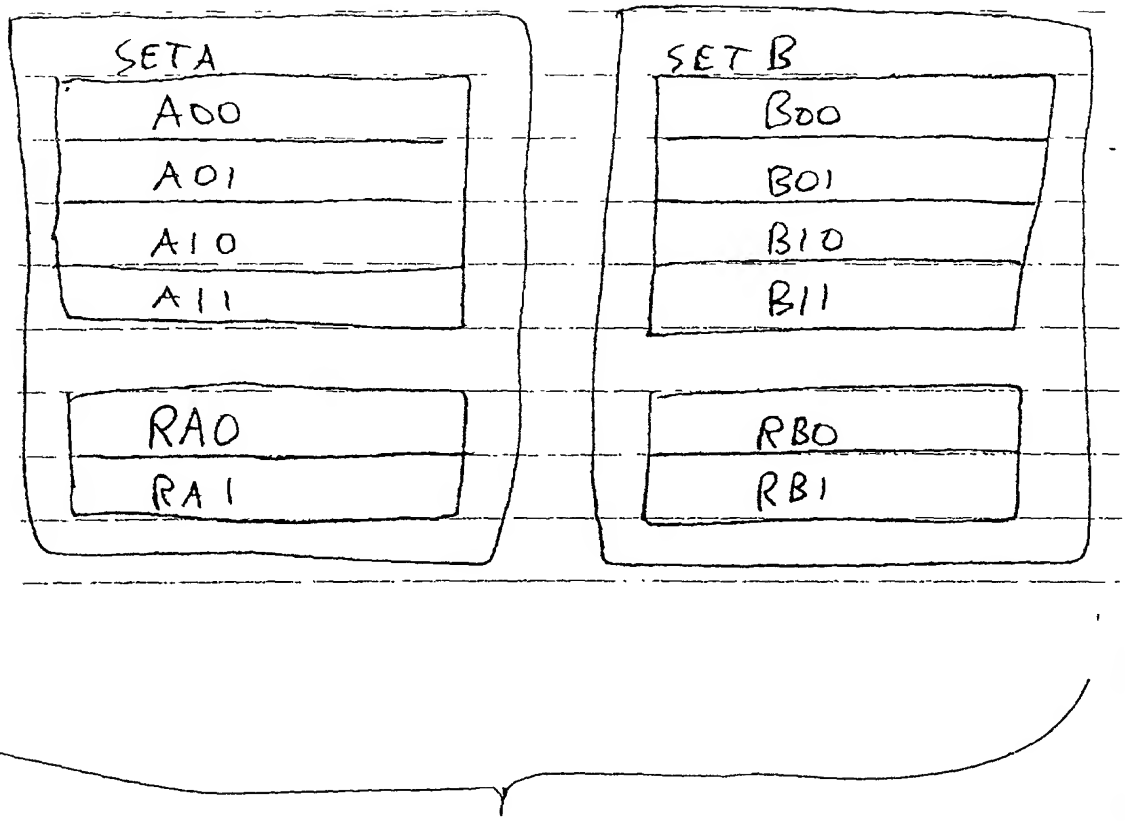

FIGURE 3

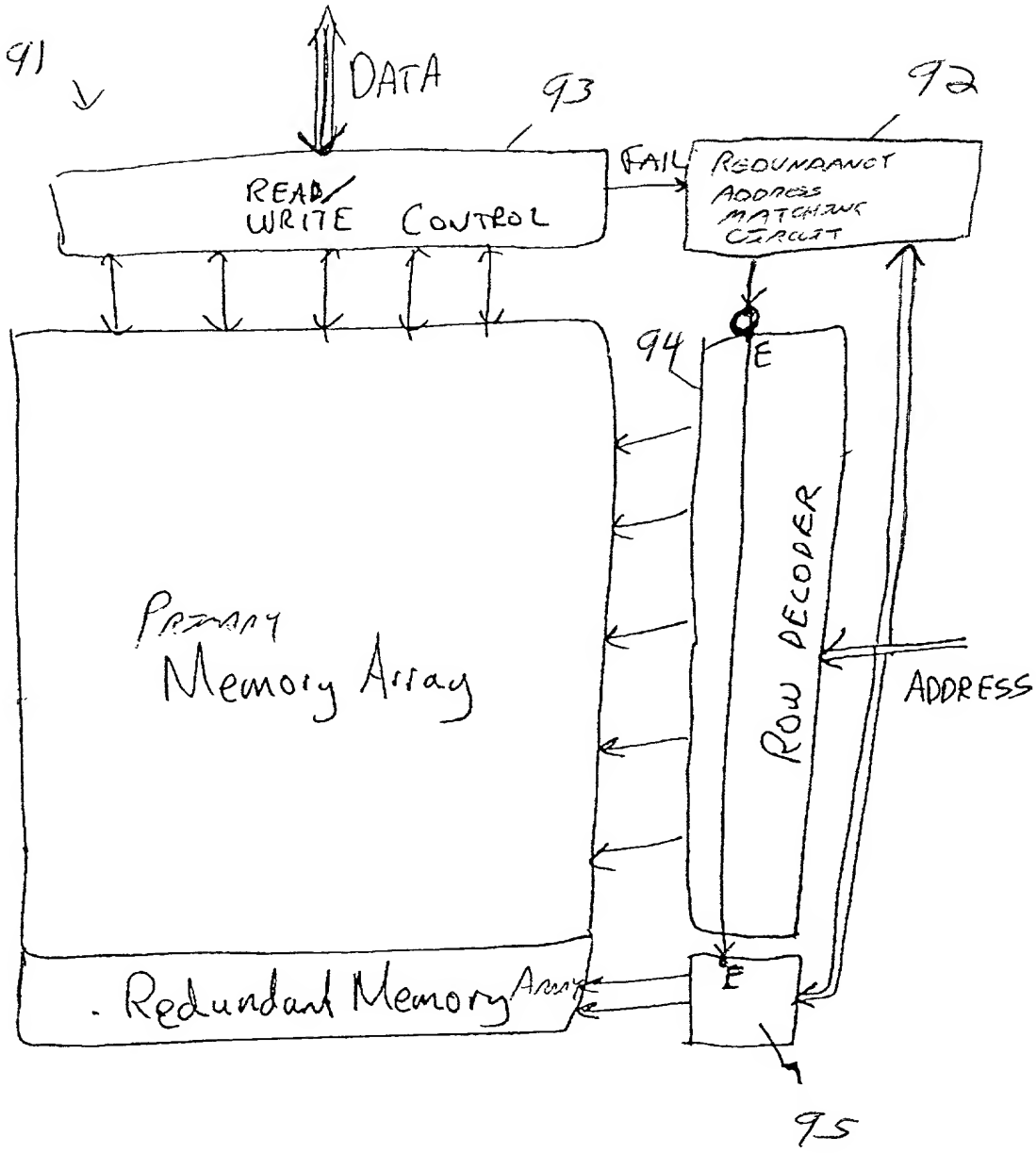
91
DATA
93
92
READ/
WRITE CONTROL
FAIL
REDUNDANCY
ADDRESS
MATCHING
CIRCUIT
94
E
PRIMARY
Memory Array
ROW DECODER
ADDRESS
Redundant Memory Array
E
95

FIGURE 4

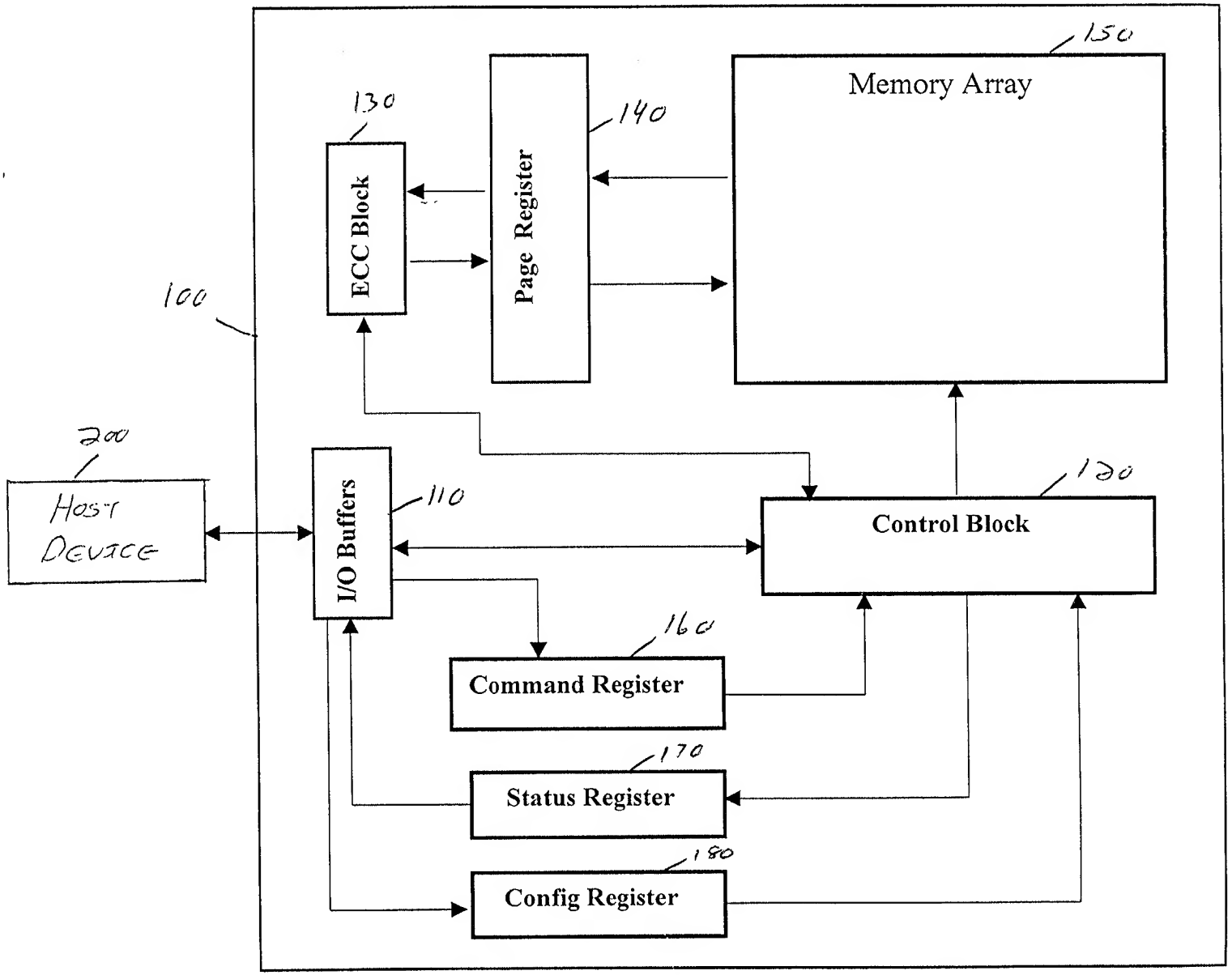
150
Memory Array
130
ECC Block
140
Page Register
100
200
Host Device
I/O Buffers
110
120
Control Block
160
Command Register
170
Status Register
180
Config Register

FIGURE 5

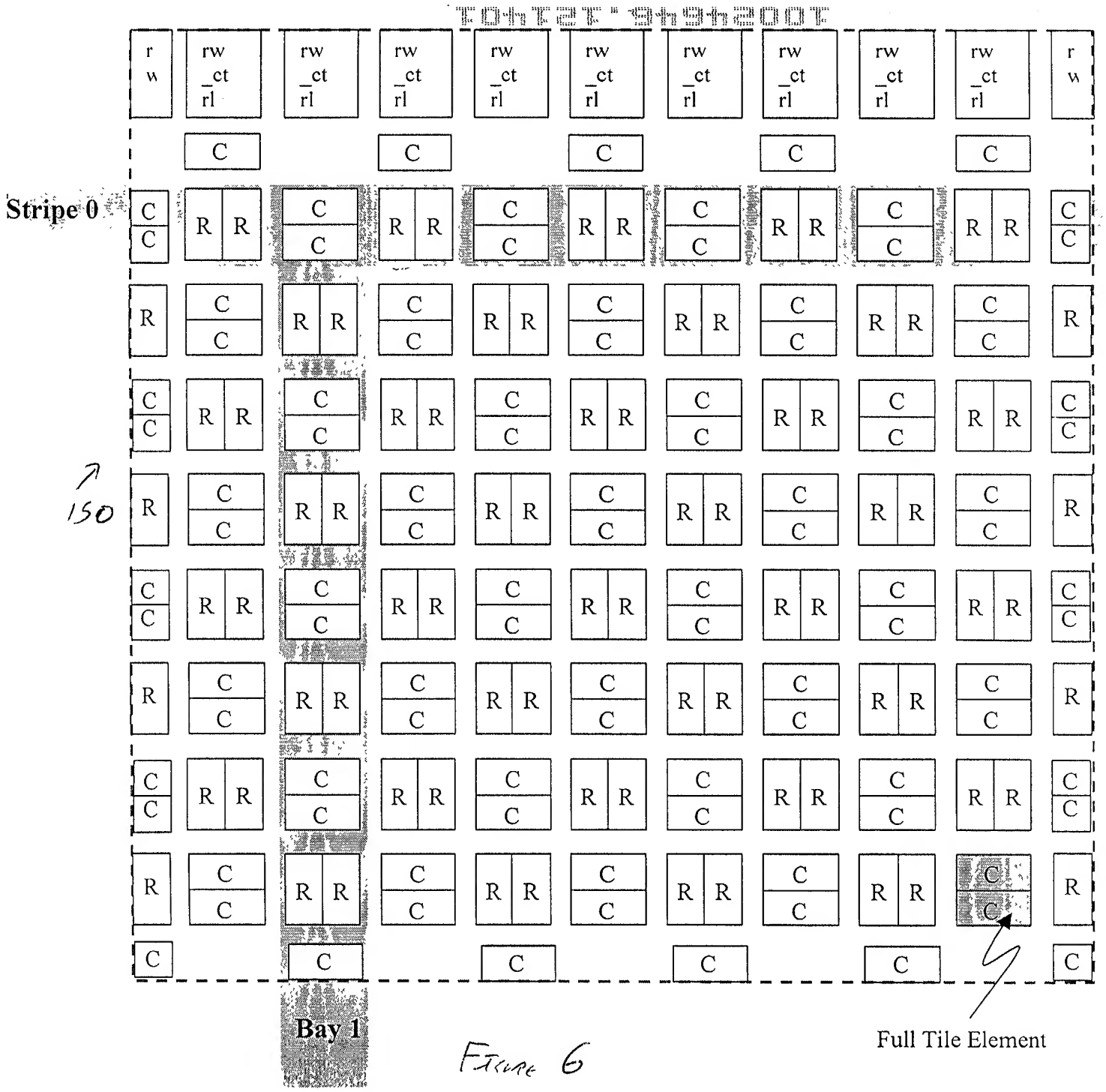

FIGURE 6

TARGET 9-9-2001

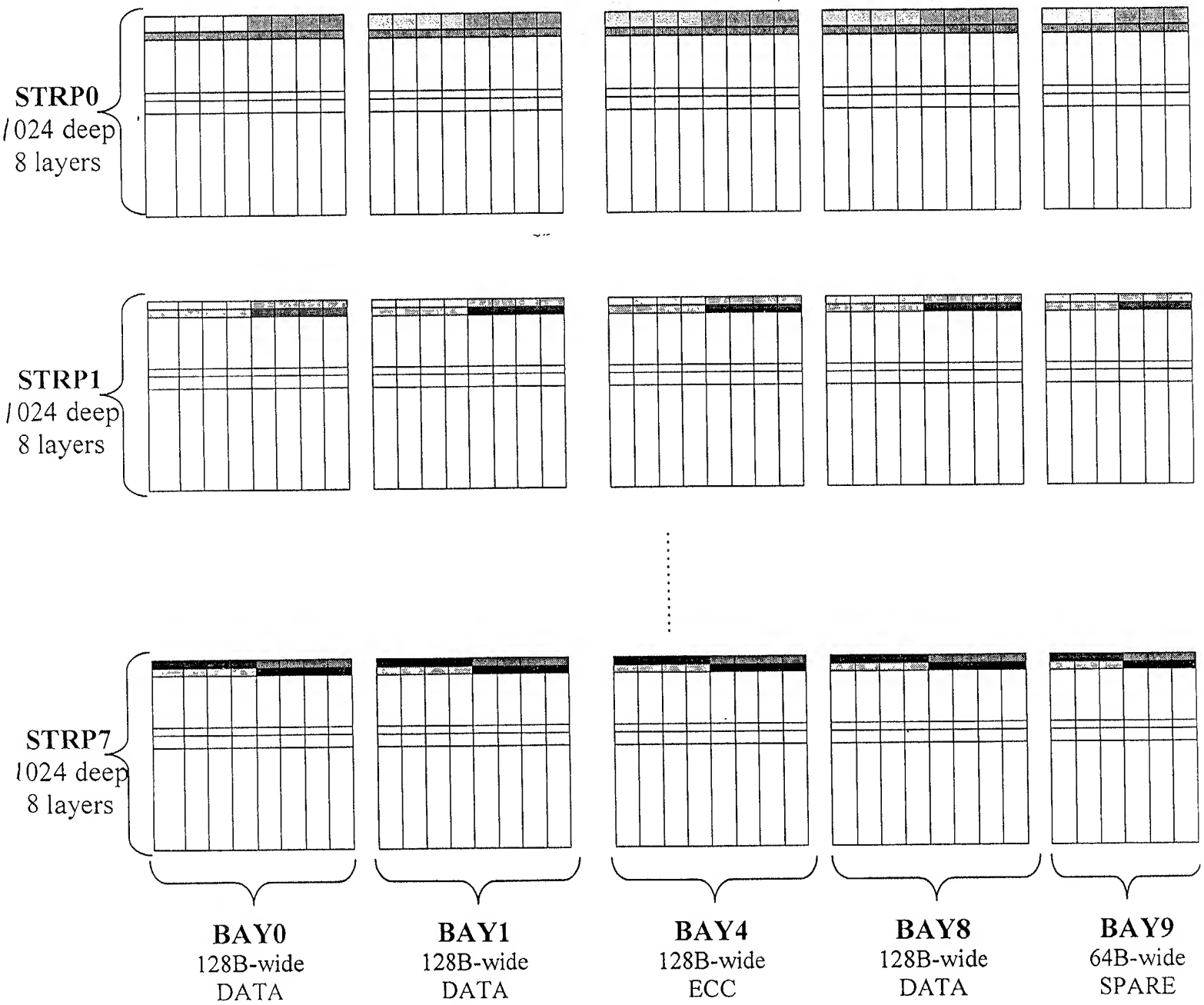

FIGURE 7

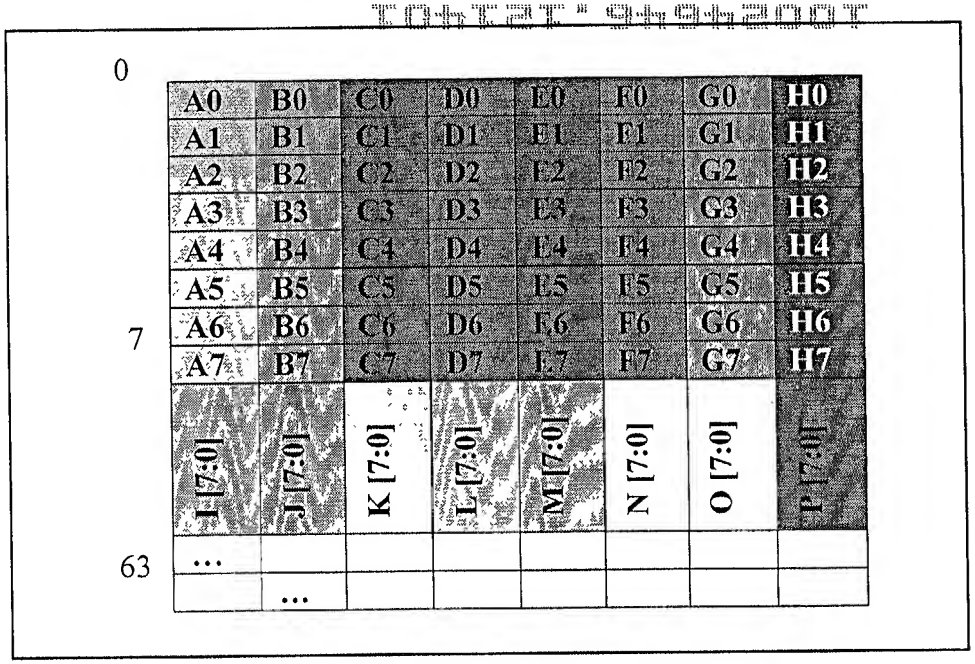

FIGURE 8

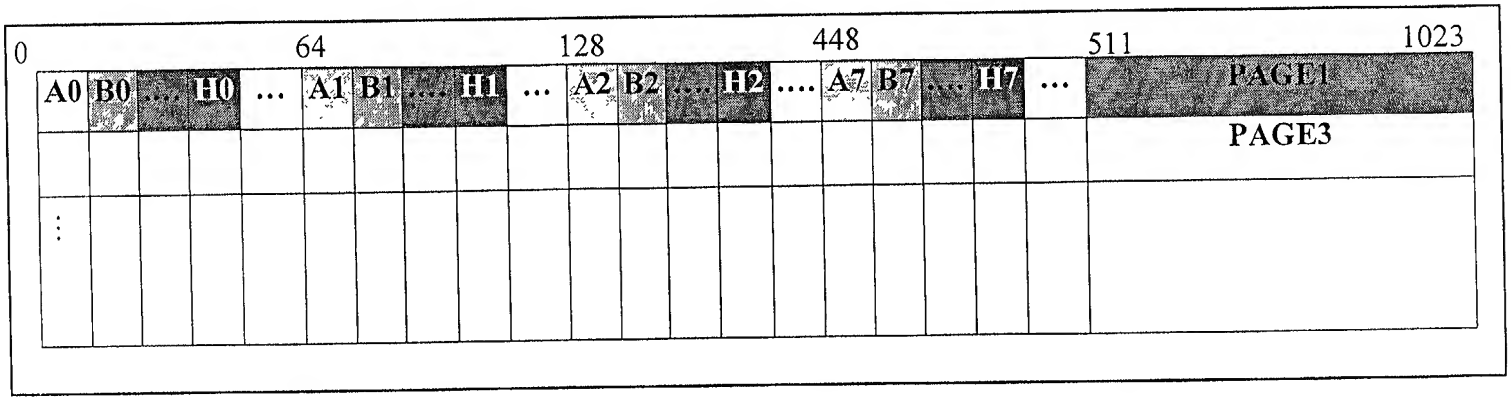

FIGURE 9

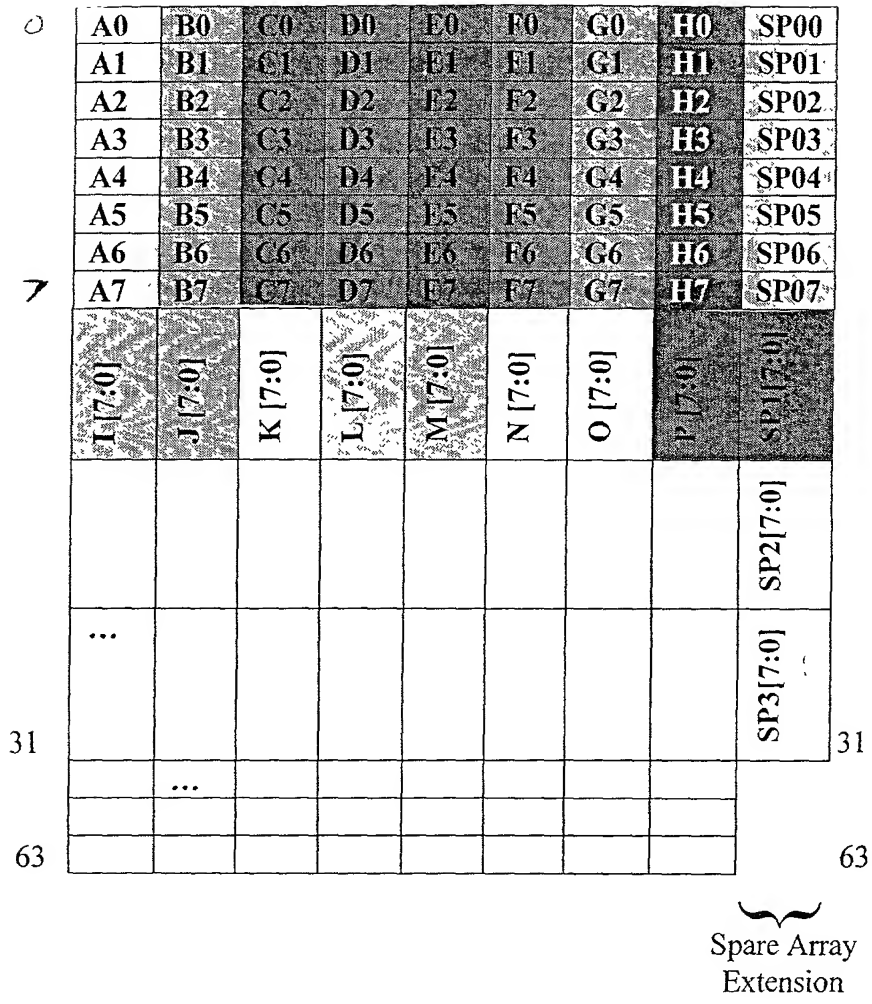

FIGURE 10

SubReg0	SubReg1	SubReg2	SubReg3	SubReg4	SubReg5	SubReg6	SubReg7	SubReg8
XY	SP0	XY	SP1	XYM	SP0	XY	SP1	XY
R	SP1	R	SP0	RM	SP1	R	SP0	R
SP0	XY	SP1	XY	ECC0	XYM	SP1	XY	SP0
SP1	R	SP0	R	ECC1	RM	SP0	R	SP1

FIGURE 11

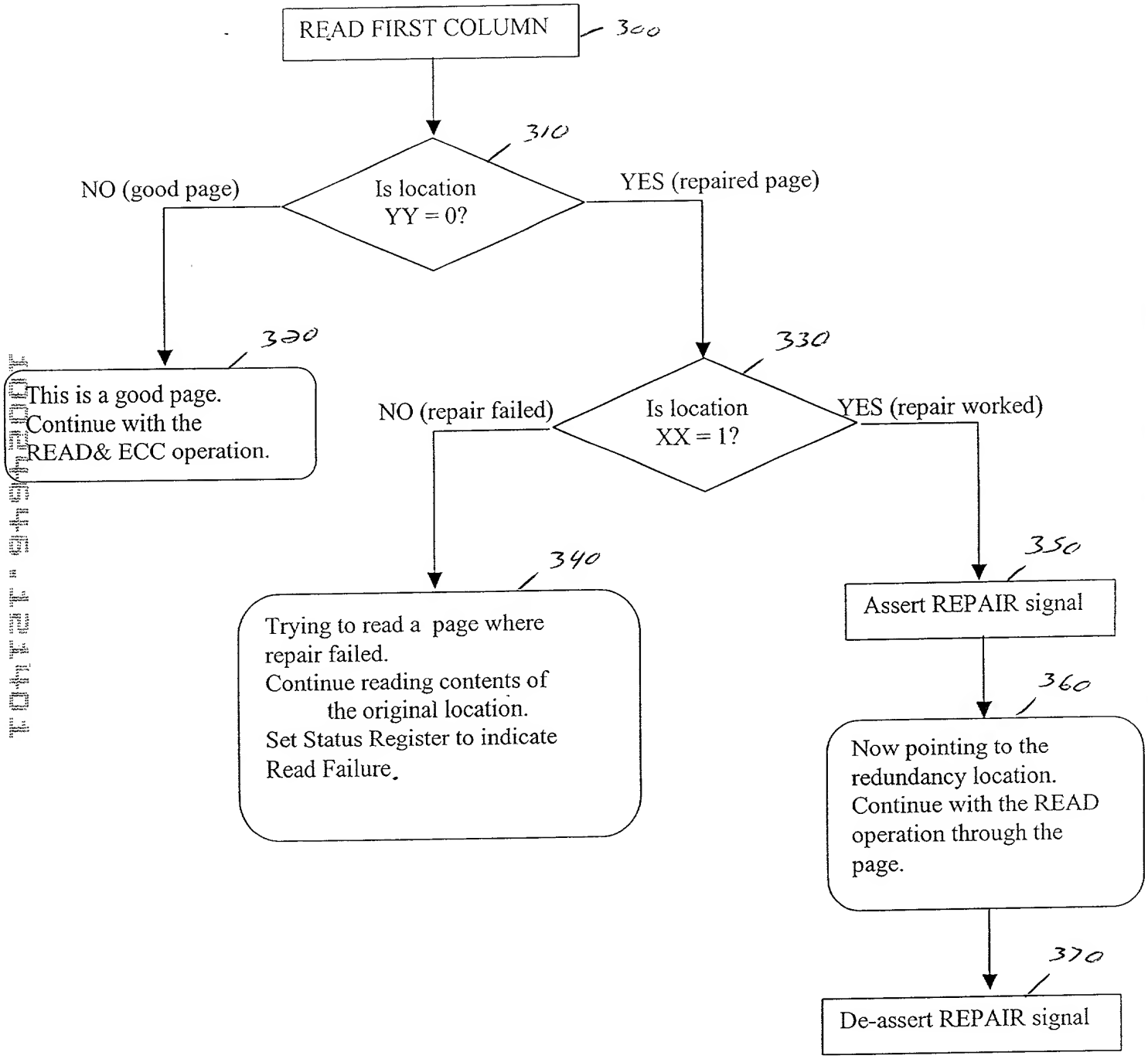
READ FIRST COLUMN
300
310
Is location YY = 0?
NO (good page)
YES (repaired page)
320
This is a good page. Continue with the READ& ECC operation.
330
Is location XX = 1?
NO (repair failed)
YES (repair worked)
340
Trying to read a page where repair failed.
Continue reading contents of the original location.
Set Status Register to indicate Read Failure.
350
Assert REPAIR signal
360
Now pointing to the redundancy location. Continue with the READ operation through the page.
370
De-assert REPAIR signal

FIGURE 12

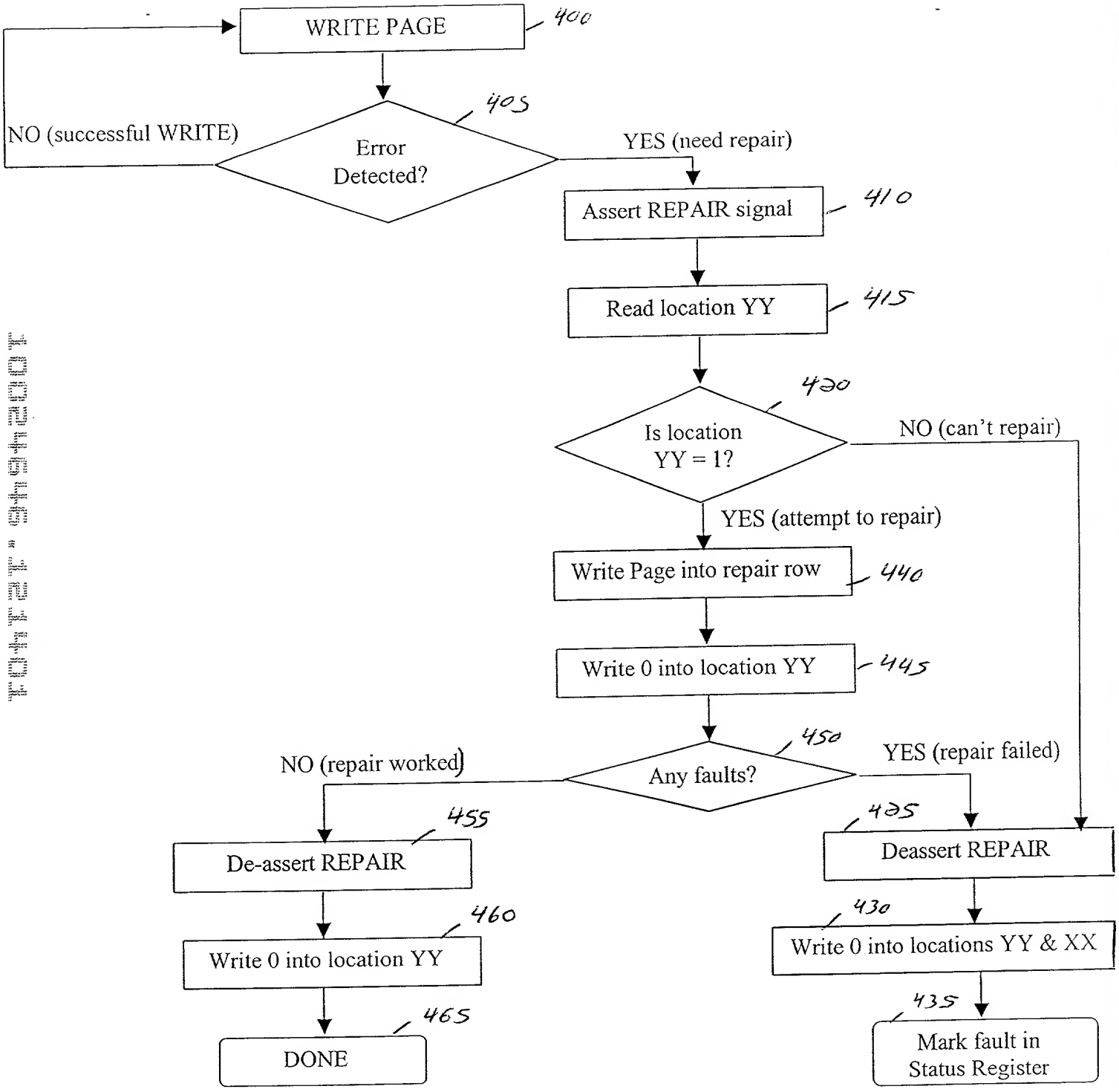
WRITE PAGE
400
Error Detected?
405
NO (successful WRITE)
YES (need repair)
Assert REPAIR signal
410
Read location YY
415
Is location YY = 1?
420
NO (can't repair)
YES (attempt to repair)
Write Page into repair row
440
Write 0 into location YY
445
Any faults?
450
NO (repair worked)
YES (repair failed)
De-assert REPAIR
455
Deassert REPAIR
425
Write 0 into location YY
460
Write 0 into locations YY & XX
430
DONE
465
Mark fault in Status Register
435

FIGURE 13

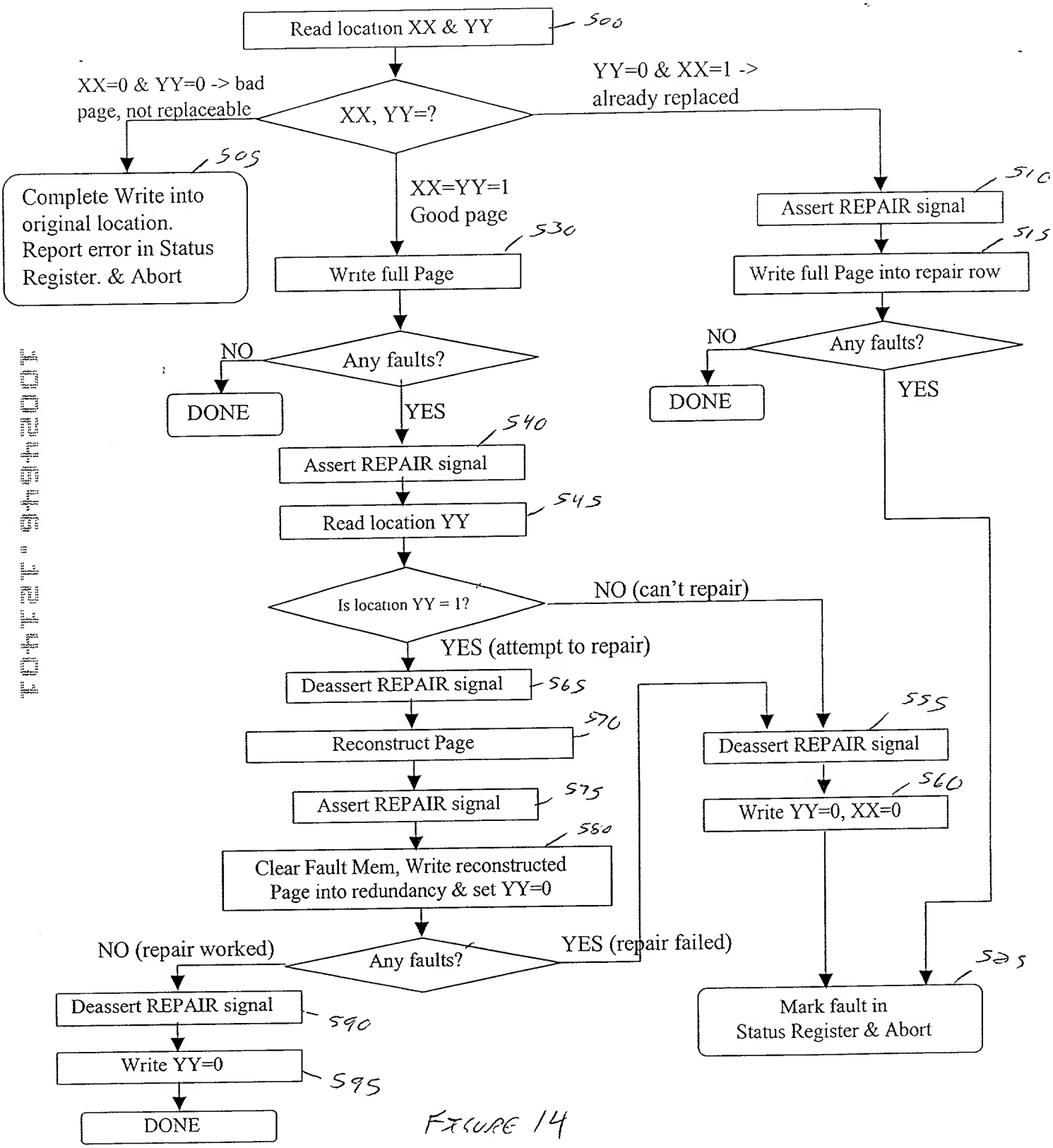
Read location XX & YY
500
XX=0 & YY=0 -> bad page, not replaceable
XX, YY=?
YY=0 & XX=1 -> already replaced
505
Complete Write into original location. Report error in Status Register. & Abort
XX=YY=1 Good page
510
Assert REPAIR signal
530
Write full Page
515
Write full Page into repair row
NO
Any faults?
NO
Any faults?
DONE
YES
DONE
YES
540
Assert REPAIR signal
545
Read location YY
Is location YY = 1?
NO (can't repair)
YES (attempt to repair)
565
Deassert REPAIR signal
555
Deassert REPAIR signal
570
Reconstruct Page
560
Write YY=0, XX=0
575
Assert REPAIR signal
580
Clear Fault Mem, Write reconstructed Page into redundancy & set YY=0
NO (repair worked)
Any faults?
YES (repair failed)
585
Mark fault in Status Register & Abort
590
Deassert REPAIR signal
595
Write YY=0
DONE

FIGURE 14